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States and events for S-level gradable adjectives *

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Abstract The event analysis is only rarely incorporated into degree-theoretic treatments of adjectival comparatives. I propose a neodavidsonian account of predications like *Ann was happy* that involves quantification over both states and events. This 'double-eventuality' analysis is motivated primarily by how stage-level gradable adjectives interact with temporal *for*-phrases in two classes of comparatives, which I differentiate as 'low' versus 'high' attachment of the comparative morpheme. Low attachment comparatives express canonical degree readings (*more available*), while high attachment involve comparing numbers of occasions (*available more*). I resolve these patterns by positing a stative core for adjectives, and the possibility of mapping properties of states to properties of events. Low attachment interpretations, then, involve comparison of states, and high involve comparison of (pluralities of) events. I show that the analysis extends to other cases where states and events can do work for adjectives outside of comparatives.

Keywords: gradable adjectives, S-level adjectives, degree semantics, event semantics, comparatives, temporal modification

1 Introduction

Since Davidson (1967) introduced event quantification into the logical form of action sentences, the 'event analysis' has gotten richer. Ignoring tense, a traditional translation of (1a) in terms of a two-place relation like (1b) was supplanted by Davidson as (1c), which interprets the verb as a three-place relation and the sentence as an existential statement about events. Very quickly, (1c) was suggested in place of (1d), wherein the kicker and kickee are linked to the semantics of *kick* not directly, but via thematic role predicates (Castaneda 1967; Parsons 1990).

(1) a. Ann kicked Bill.
b. $\mathbf{kick}(a,b)$
c. $\exists e[\mathbf{kick}(e,a,b)]$
d. $\exists e[\text{agent}(e,a)\ \&\ \mathbf{kick}(e)\ \&\ \text{patient}(e,b)]$

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Along the way, the analysis of gradable property ascriptions has become richer, too, but in a different way. Often, a sentence like (2a) is still likely to be translated as (2b), expressing only that Ann has a certain property. In degree-based frameworks designed to capture adjectival gradability, translations like (2b) are supplanted by logical forms involving measure functions: for example, *happy* in (2c) relates Ann to how much of the happiness property she instantiates (e.g., Kennedy 1999; cf. Cresswell 1976), and compares that to a standard for happiness.

(2) a. Ann was happy.
b. $\mathbf{happy}(a)$
c. $\mathbf{happy}(a) \succcurlyeq \text{standard}(\mathbf{happy})$

More recently, evidence has mounted within degree-based frameworks that even apparently simple predications like (2a) involve quantification over states (e.g., Fults 2006; Husband 2010; Wellwood 2014, 2015; Baglini 2015). In this paper, I use evidence from temporal modification in comparatives to suggest that (2a) can translate like (3), expressing quantification over both states s and events e. On this proposal, *happy* introduces a measure on states which, in the positive form, must exceed some standard level of happiness; those states can then be packaged in an event 'wrapper' (cf. Rothstein 1999).

(3) $\exists e \exists s[e \rhd_\tau s \;\&\; \text{holder}(s,a) \;\&\; \mathbf{happy}(s) \succcurlyeq \text{standard}(\mathbf{happy})]$
where $\rhd_\tau$ is read: 'is temporally constituted by'

While the traditional focus on adjectival comparatives has focused on sentences like (4a), my major argument depends on how sentences like that in (4b), in which *more* appears in a non-canonical structural position, are interpreted. Where (4a) involves comparing degrees of happiness simpliciter, (4b) compares numbers of occasions of being happy. My diagnosis of this difference is that (4a) expresses a comparison between states, while (4b) compares (pluralities of) events.

(4) a. Ann was **happier** than Bill was. 'LOW'
b. Ann was **happy more** than Bill was. 'HIGH'

The evidence for this claim comes from consideration of structures like (5), with the intended constituency indicated. (5a) expresses that the number of occasions of Ann's being happy for a two day stretch at a time exceeds the number of occasions of Bill being happy for stretches of that length.[1] In contrast, (5b) expresses that the

1 A salient reading of the string in (5a) bundles the *for*-phrase with the comparative. Such a parse would function well in response to the question: *How long was Ann happy, compared to Bill?*. This paper is not about that parse. On the intended parse, (5a) would function well in response to the question, *How many times was Ann happy for 2 days, compared to Bill?*.

number of occasions on which Ann was happy exceeds the number of occasions on which Bill was happy, and these occasions occurred over the course of two days. On my analysis, (5a) involves the *for*-phrase combining with a property of states prior to a mapping to events, and (5b) involves the *for*-phrase combining with the derived property of events.

(5) a. Ann was [happy **for 2 days**] [**more** than Bill was].
b. Ann was [happy **more** than Bill was] [**for 2 days**].

I turn to these data directly, and explain why an account that posits the ontological richness of (3) is necessary to account for them. Following that, I present my analysis, as well as independent evidence for each layer of the double-eventuality approach.

2 Motivating events and states for S-level gradable adjectives

My major empirical motivation for a double-eventuality analysis for (at least some) adjectives is based on consideration of how expressions that are both gradable and stage-level interact interpretively with modifiers expressing duration. What distinguishes S-level gradable adjectives is that they flexibly allow for both 'low' and 'high' attachment of comparative morphemes like *-er*/*more*, and the two types of comparatives have distinct interpretations. After discussing the data, I show how standard accounts of the syntax-semantics of adjectival comparatives are not yet representationally rich enough to capture these data.

2.1 Main data

What I call the 'low' attachment of the comparative morpheme is exemplified in (6-7). These sentences indicate comparison of two levels of happiness/availableness and tallness/aliveness (e.g., Cresswell 1976; von Stechow 1984). Felicity of 'low' comparatives for a given adjective *A* typically serves to distinguish *A* as gradable; focus on gradability correspondingly lead researchers to focus on the analysis of sentences like these.

(6) a. Ann was **happier** than Bill was.
b. Ann was **more available** than Bill was.

(7) a. Ann was **taller** than Bill was.
b. Ann was **more alive** than Bill was.

What I call instances of 'high' attachment are different (Wellwood 2014): (8) express comparisons between numbers of occasions of being happy/available. Felicity

here, for a given adjective *A*, distinguishes *A* as stage-level as opposed to individual-level (see, e.g., Carlson 1977 and Husband 2010 for the distinction): the examples in (9) are odd, apparently because of a clash between a lexical preference for expressing 'once-only' or 'long-lasting' properties, and the construction's suggestion that the property can hold on different numbers of occasions.

(8) a. Ann was **happy more** than Bill was.
b. Ann was **available more** than Bill was.

(9) a. ? Ann was **tall more** than Bill was.
b. ? Ann was **alive more** than Bill was.

As we will see, the observation of a semantic difference between (6) and (8) is not particularly devastating for existing accounts of the semantics of comparatives. The distinction could fairly easily be captured using semantic tools that are well-established for use elsewhere: the 'low' comparative might involve comparison of degrees introduced by the lexical adjective (e.g., Kennedy 1999; Heim 2000) and the 'high' comparative comparison of measures of states.[2] Yet, a whiff of suspicion arises once temporal *for*-phrases are brought into the 'high' attachment picture.

First, notice that temporal *for*-phrases raise no trouble for the 'low' attachment comparative. The examples in (10) are intuitively truth-conditionally equivalent: both express that Ann's degree of availableness exceeded Bill's over the course of 2 days. There are many possible ways of analyzing these and related data that won't cause any trouble, to my mind, and as such they are not the focus of the present inquiry; nonetheless, I give sketches in §2.2 and §3.1.[3]

(10) a. Ann was **more available** than Bill was for 2 days.
b. Ann was **more available** for 2 days than Bill was.

Contrast this with the 'high' attachment comparative: here, where a temporal *for*-phrase occurs is not truth-conditionally neutral. The sentences I will focus on are as in (11), with the intended bracketing indicated. To appreciate the significance of these examples, I will first demonstrate the sorts of contexts in which they are felicitously used, and then a context in which their truth conditions come apart.

(11) a. Ann was [**available** for 2 days] **more** than Bill was.
b. Ann was [**available more** than Bill was] for 2 days.

2 This may not be trivial, though, if indeed sentences like (8) involve comparison of numbers of occasions; stative predicates should not provide the materials for counting. See §3.4.

3 The details will depend on when states are introduced into the compositional semantics (cf. Husband 2010), and exactly how *than*-clauses and ellipsis work here (see Bresnan 1973; Bhatt & Pancheva 2004; Lechner 2004; Alrenga, Kennedy & Merchant 2012; Larson & Wellwood 2015, among others).

Ann's schedule

Mo	Tu	We	Th	Fr	Sa

Bill's schedule

Mo	Tu	We	Th	Fr	Sa
				XXXX	

Figure 1 **Two contractors**, Ann and Bill, schedule their 6-day workweeks in 2-day chunks. Here are their schedules last week, where 'XXXX' indicates unavailability.

Ann's schedule

Mo	Tu
	XXXX
	XXXX
	XXXX
	XXXX
	XXXX

Bill's schedule

Mo	Tu
	XXXX
	XXXX
XXXX	XXXX
XXXX	XXXX
XXXX	XXXX
XXXX	XXXX
XXXX	XXXX

Figure 2 **Two counselors**, Ann and Bill, schedule their 7-hour workdays in 1-hour slots. Here are their schedules on Monday and Tuesday, where 'XXXX' indicates unavailability.

In the context depicted in Figure 1, two contractors divide their 6-day workweeks into two day chunks. Last week, 0/3 of Ann's two-day slots were booked, but 1/3 of Bill's were. (11a) can be used truthfully and felicitously here; in fact, it follows as a natural inference from (12). Use of (11b) here would describe a different aspect of the situation, e.g., a strict subset of the set of days that (11a) talks about.

(12) a. Ann was available for two days, three times.

b. Bill was available for two days, twice.

In the context depicted in Figure 2, Ann and Bill are counselors whose schedules are divided into one hour slots. On Monday and Tuesday, only 5/14 of Ann's were filled, but 12/14 of Bill's were. (11b) can capture this context, and even follows as a natural inference from (13). The reverse isn't true: (11a) can't be used here.[4]

(13) a. Ann was available for nine hours over Monday and Tuesday.

4 Applying a certain parenthetical intonation to the string in (11a) makes it seem like it could, e.g., *Ann was available (for two days) more than Bill was*. This feels like a different parse, perhaps one indicating extraposition of the *than*-clause over the (higher) *for*-phrase.

Ann's schedule						Bill's schedule					
Mo	Tu	We	Th	Fr	Sa	Mo	Tu	We	Th	Fr	Sa
XXXX		XXXX								XXXX	

Figure 3 Non-equivalence.

b. Bill was available for two hours over Monday and Tuesday.

A case where both (11a) and (11b) can be used but they come apart truth-conditionally is depicted in Figure 3. Here, we again consider Ann and Bill's 6-day schedules divided into 2-day chunks. Ann is available for 1/3 of those, and Bill is available for 2/3. Here, (11a) is FALSE; 1 is not greater than 2. In contrast, (11b) can be TRUE: Ann is fully available Friday/Saturday, whereas Bill isn't—the number of occasions of availability for Ann on those days is definitely greater.[5]

It is clear enough to see that the sentences in (11a) and (11b) are not equivalent; there is also a sense that the sentences aren't even about the same things.

2.2 Existing analyses are not expressive enough

Given some minimal assumptions about how *for*-phrases work semantically, the data just discussed cannot be captured straightforwardly on approaches to adjectival comparatives that fail to posit eventualities in their semantics. At least a stative layer is required; in fact, even accounts that posit such a layer suffer from positing too few eventualities. To show this, I present a simplified version of a state-based semantics for gradable adjectives corresponding primarily to suggestions by Husband (2010) and Baglini (2015), wherein gradable adjectives express mappings from states rather than individuals to degrees.[6]

First, suppose that *for*-phrases are interpreted as in (14) (cf. Larson 2003; Rothstein 2004; Champollion 2010): they relate eventualities α (type v) to their runtimes, via τ. There must be additional conditions, of course, in order to capture the fact that *for*-phrases combine with stative (*Ann loved Bill for five years*), activity (*Ann ran for two hours*), and semelfactive predicates (*Ann sneezed for five minutes*),

5 Interestingly, (11b) can also be true here—it depends on which days we zoom in on. This observation doesn't appear to derail the point about non-equivalence.

6 An incorporation of the specifics offered by Husband 2010 quickly runs into trouble with the basic comparative cases discussed in this paper. For space reasons, I won't go into the details; the basic issue is that Husband introduces states syntactically via a verbal morpheme, POS_v, which also functions to relate a type $\langle e,d\rangle$ adjectival interpretation to a standard degree. Assigning these jobs to separate morphemes (e.g., a 'stativizing' morpheme separate from a more typical POS) would likely correct the matter. The proposal would then, more or less, correspond to that in the text.

but they don't do so well with singular event predicates (*?Ann died for ten minutes*; cf. Rothstein 2004). We can safely ignore these additional conditions here.

(14) $[\![\text{for two days}]\!] = \lambda\alpha_v.\tau(\alpha) = \textbf{2-days}$ $\langle v,t\rangle$

If eventualities simpliciter are needed for the interpretation of *for*-phrases, then combinations with adjectives like *available* must indicate that one is present. We can slightly amend a Kennedy-style semantics (type $\langle e,d\rangle$; e.g., Kennedy 1999; cf. the degree-relation analysis, type $\langle d,\langle e,t\rangle\rangle$; e.g., Heim 2000), so that gradable adjectives relate states rather than individuals to degrees as in (15).

(15) $[\![\text{available}]\!] = \lambda s_v.\textbf{available}(s)$ $\langle v,d\rangle$

A couple of further compositional pieces, and we have almost all we might need. Suppose that, outside of the comparative form, a POS for eventualities relates the adjectival measure function to a standard, (16a). States are linked to their bearers by a 'holder' relation, itself introduced by a stative Voice head, notated v_s in (16b) (Kratzer 2000; Husband 2010; cf. Parsons 1990). An XP that has combined with v_s will compose with its subject by the rule of Event Identification (Kratzer 1996).

(16) a. $[\![pos_v]\!] = \lambda g_{\langle v,d\rangle}.\lambda\alpha_v.g(\alpha) \succcurlyeq \text{standard}(\mathbf{g})$
b. $[\![v_s]\!] = \lambda x_e.\lambda s_v.\text{holder}(s,x)$

Combining these pieces, the basic cases are straightforward. First, the composition of adjectives like *available* with *for*-phrases, (17a). This is read, 'Ann is in an availableness state s which exceeds the standard for availableness, and s holds for two days.' Second, the case of composition of 'low' comparatives with *for*-phrases, (17b). Abbreviating the interpretation of the *than*-clause with δ, this is read, 'Ann is in an availableness state s which exceeds δ, and s holds for two days.'

(17) a. $[\![\text{Ann was POS available for two days}]\!] =$
$\exists s[\text{holder}(s,a)\ \&\ \textbf{available}(s) \succcurlyeq \text{standard}(\textbf{available})\ \&\ \tau(s) = \textbf{2-days}]$
b. $[\![\text{Ann was more available for two days than Bill was}]\!] =$
$\exists s[\text{holder}(s,a)\ \&\ \textbf{available}(s) \succ \delta\ \&\ \tau(s) = \textbf{2-days}]$

While this approach will allow us to capture the basic cases, it won't allow us to capture those that are the focus of this article, repeated from (11) in (18).

(18) a. Ann was [**available** for 2 days] **more** than Bill was.
b. Ann was [**available more** than Bill was] for 2 days.

Suppose for the moment that the post-adjectival position of *more* indicates that it does not combine with the adjective directly. Instead, a measure function is introduced by (the verbal equivalent of) *much* or *many* (cf. Wellwood, Hacquard & Pancheva 2012). For present purposes, suppose that it expresses the cardinality function (type $\langle v,d\rangle$, here), indicated by $||$.[7] If the only thing that can be input to this function is a state, then the account we are entertaining incorrectly predicts (18) to be truth-conditionally identical.

That is, whether the *for*-phrase appears low (as in (18a)) or high (as in (18b)), it will apply to one and the same states. I assume that in 'high' attachment comparatives, the adjective has combined with POS; their combination delivers (19): a property of states whose availableness extent exceeds the standard for availableness.

(19) $[\![\text{POS available}]\!] = \lambda s.\textbf{available}(s) \succcurlyeq \text{standard}(\textbf{available})$
henceforth abbreviated: $\lambda s.\textbf{available}_{\succcurlyeq_{std}}(s)$

Now, where the *for*-phrase attaches will make no difference. Attaching it close to the adjective derives (20a), adding a comment about how long the states have to hold; combined with *more* and *than* (abbreviated as δ), the number of the states has to be greater than δ. Attaching it high, after the comparative modification is complete, (21a), delivers exactly the same property, (21b)—there is no status whatsoever to the different order of conjuncts in (20b) and (21b).

(20) a. $[\![[\text{POS available}]\text{ for two days}]\!] =$
$\lambda s.\textbf{available}_{\succcurlyeq_{std}}(s)\ \&\ \tau(s) = \textbf{2-days}$

b. $[\![[[\text{POS available}]\text{ for two days}]\text{ more}_{\delta}]\!] =$
$\lambda s.\textbf{available}_{\succcurlyeq_{std}}(s)\ \&\ \tau(s) = \textbf{2-days}\ \&\ |s| \succ \delta$

(21) a. $[\![[\text{POS available}]\text{ more}_{\delta}]\!] =$
$\lambda s.\textbf{available}_{\succcurlyeq_{std}}(s)\ \&\ |s| \succ \delta$

b. $[\![[[\text{POS available}]\text{ more}_{\delta}\ ]\text{ for two days}\ ]\!] =$
$\lambda s.\textbf{available}_{\succcurlyeq_{std}}(s)\ \&\ |s| \succ \delta\ \&\ \tau(s) = \textbf{2-days}$

Combining the interpretation of the subject, a, with these property terms and existential closure at the top of the sentence (whether by a higher functional head or a default interpretive rule), both of (18) will translate as in (22). This is a bad result.

(22) $\exists s[\text{holder}(s,a)\ \&\ \textbf{available}_{\succcurlyeq_{std}}(s)\ \&\ \mu(s) \succ \delta\ \&\ \tau(s) = \textbf{2-days}]$

7 This choice isn't innocent—intuitively, 'high' attachment comparatives involve comparison by number, supporting this choice. But this already introduces a worry: if stative predicates are relevantly mass-like, it's not obvious that they should be countable.

3 The analysis

I resolve these data by continuing to posit a stative core to adjectives like *happy*, and creating the possibility of mapping its states to events. In (11)/(18), the difference comes down to the fact that the relevant events are constituted by states with different temporal commitments. The *for*-phrase in (11a)/(18a) specifies how long a state holds, while that in (11b)/(18b) specifies over what period the occasions (defined in terms of states of unspecified duration) occurred. The lack of equivalence exists because the *for*-phrase applies to different eventualities between the two cases; regardless, 'high' *more* involves quantification over events.

3.1 Assumptions about 'low' comparatives with *for*-phrases

I begin by precisifying somewhat what I take to be the core interpretation of adjectives like *available* and that of *more*. It won't do, to my mind, to pretend that *more* lexically expresses the cardinality function.

I drop reference to POS in the narrow adjectival complex, following Wellwood (2012, 2014, 2015), and introduce degrees via the MUCH part of *more* (i.e., *more* = MUCH+ER; Bresnan 1973). Simplifying this analysis, *available* is interpreted as a simple property of states (cf. Dowty 1979), (23a), and *more* bears an index μ that receives a measure function value by the assignment function A, (23b).[8,9]

(23) a. $[\![\text{available}]\!]^A = \lambda s_v.\textbf{available}(s)$

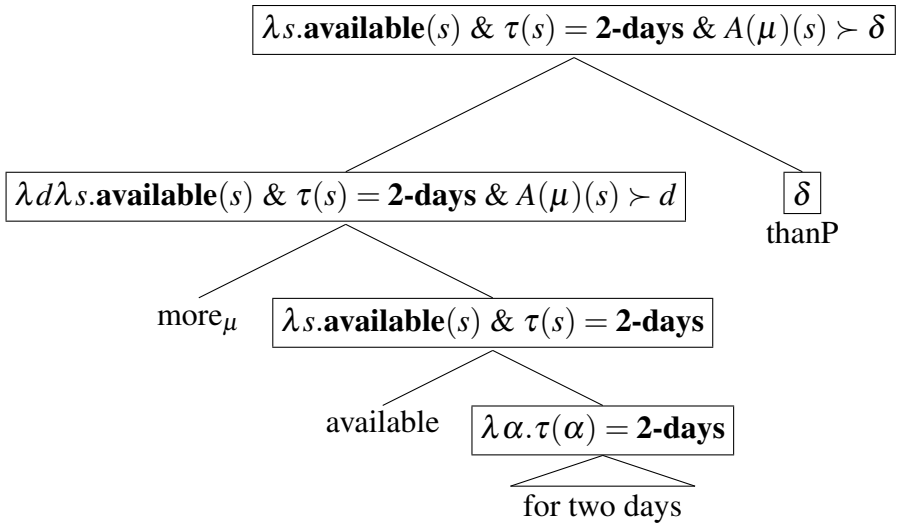
b. $[\![\text{more}_\mu]\!]^A = \lambda d \lambda P_{\langle v,t\rangle} \lambda \alpha_v.A(\mu)(\alpha) \succ d$

When *for two days* appears between the adjective and the *than*-clause, the two combine (via an eventuality-type Predicate Modification; cf. Heim & Kratzer 1998) to create a complex property of states that are identified with the input to *more*, (24). When it appears following the comparative complex, it and the *for*-phrase can similarly combine, (25). The two properties derived in this case are the same: both are true of states of availableness that hold for 2 days and whose measures are greater than δ, here an abbreviation for the degree contributed by the *than*-clause.

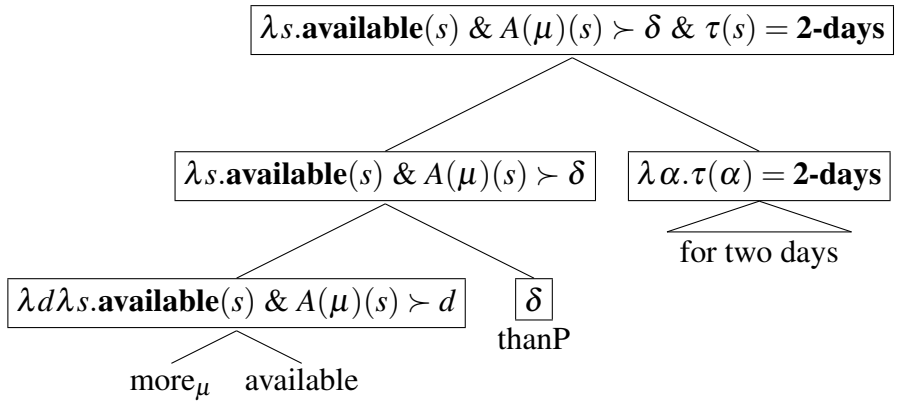
8 The interpretation in (23b) is actually more specific to the eventuality domain than it needs to be; see Wellwood 2014, 2015 for discussion.

9 Here is how a POS-based approach would differ from what I say in the text: (i) the adjective itself would introduce degrees in the 'low' comparative, and (ii) **available**(s) would be related to a standard in the 'high' comparative. The version I present renders it transparent how the same form *more* can appear in both types, and affords *more* the same dual semantic role in both: mapping to degrees (MUCH) and degree comparison (-ER).

(24)



(25)



When the resultant property is existentially closed, (26) and (27) are delivered. These results are truth-conditionally identical, as desired.

(26) $[\![\text{Ann was more available for two days than Bill was.}]\!]^A =$
$\exists s[\text{holder}(s,a)$ & $\textbf{available}(s)$ & $\tau(s) = \textbf{2-days}$ & $A(\mu)(s) \succ \delta]$

(27) $[\![\text{Ann was more available than Bill was for two days.}]\!]^A =$
$\exists s[\text{holder}(s,a)$ & $\textbf{available}(s)$ & $A(\mu)(s) \succ \delta$ & $\tau(s) = \textbf{2-days}]$

3.2 LFs and logical forms for 'high' comparatives with *for*-phrases

'High' attachment *more* sentences seem to involve comparing numbers of things, suggesting that pluralities are being compared (see Bale & Barner 2009 for important discussion of semantically plural nouns with *more*, and Wellwood et al. 2012; Wellwood 2014 for plural verb phrases). Pluralities have atomic minimal parts, whether individuals or events (cf. Bach 1986). Thus, I analyze the 'high' attachment

comparatives as akin to a verbal comparative like *Ann jumped more than Bill*, as a comparison of pluralities of atomic events. These events are related to the states introduced by the adjective by a 'temporal constitution' relation.[10]

That relation is contributed by one of two covert entities I posit for English: the one that 'eventizes' a stative predicate, EV in (28) (cf. the covert 'eventizer' of Kratzer 2004).[11] This expression maps a property of states s to a property of (atomic) events 'temporally constituted by' by some s, (28). I imagine this as a verbal analogue of Link's (1983) 'material constitution' relation (cf. Parsons 1979), which relates objects to the substances they are made of (cf. discussion and citations in Rothstein 1999): an event e τ-constituted by a state s begins temporally when s comes to hold, and ends when s no longer holds. Something like EV is necessary, if stative properties do not deliver the atoms appropriate for a plurality.[12]

(28) $\quad [\![\text{EV}]\!] = \lambda P_{\langle v,t\rangle} : Stative(P).\lambda e_v : Atom(e).\exists s[e \rhd_\tau s \;\&\; P(s)]$

The second covert entity, PL, maps a property of atomic events to a property of pluralities of events, (29). I code this as a mapping from a property of atoms to a property of pluralities, the atoms of which have the atomic property. PL, too, seems necessary, since what EV delivers will fail to have the right properties for a comparative: comparatives abhor properties of atomic entities.[13] The specific details of the formulation in (29) aren't important; the given representation is just designed to make PL's semantic contribution maximally transparent.

(29) $\quad [\![\text{PL}]\!] = \lambda P_{\langle v,t\rangle} : Atomic(P).\lambda E_v.\forall e \in E[P(e)]$

I first put these pieces together in the base context of a 'high' comparative without a *for*-phrase, which has the interpretation given in (30). (30) says, 'there is a plurality of events E, each atom of which is temporally constituted by a state s, Ann the holder of s, and the measure of E is greater than δ'. The major contrast with the previous semantics where $more_\mu$ appears low is that the input to the measure

10 This might be one way of modeling Mourelatos' (1978) distinction between the occasion of a situation, and the situation itself.

11 This function appears to have quite similar properties to that Rothstein (1999) assigns to the copular verb. She was concerned primarily with interpretive differences like that between *Ann made Bill happy* and *Ann made Bill be happy*. I remain non-committal for now about the interpretation of the copular verb in matrix adjectival predications. For one thing, something like EV in (28) might be more broadly applicable to the explanation of variable telicity in language, depending on how one wants to analyze alternations like *run to the park* versus *run in the park* with activity *run*.

12 Rothstein (1999) presents a number of observations to suggest that adjectives are 'mass-like' in their reference; this analogy is also raised by Francez & Koontz-Garboden (In press) in their approach to deadjectival nominals in terms of 'abstract substances'.

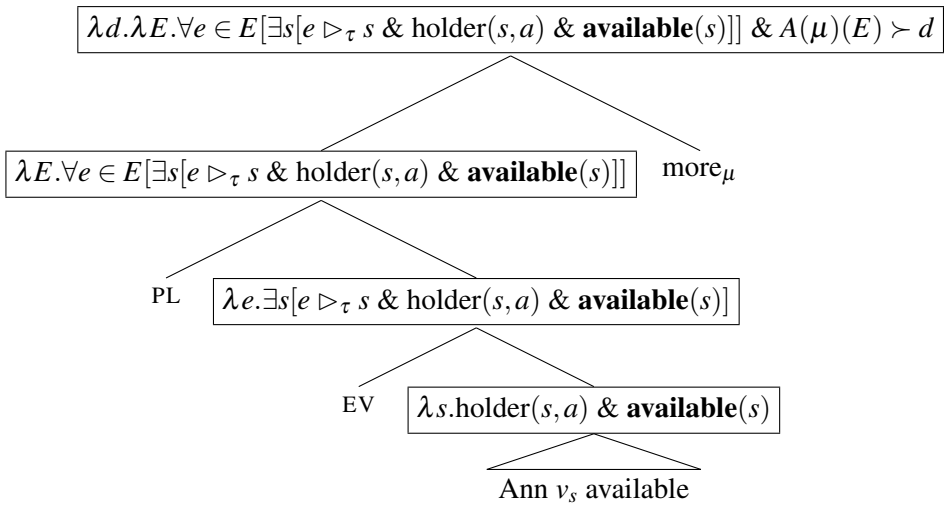
13 At least, this is how Nakanishi (2007) and Wellwood et al (2012) diagnose of the oddity of expressions like *?more idea* and *?die more*.

variable here is a plurality, which (for reasons that are not fully clear, but see Bale & Barner 2009) leads to a comparison by number.

(30) $[\![\text{Ann was available more than Bill was.}]\!]^A =$
$\exists E[\forall e \in E[\exists s[e \rhd_\tau s \;\&\; \text{holder}(s,a) \;\&\; \textbf{available}(s)]] \;\&\; A(\mu)(E) \succ \delta]$

The relevant composition is given schematically in (31). Here, I posit that the adjectival predicate, the Voice head, and the subject compose low, prior to combination with EV and PL.[14] This complex combines with EV, creating the necessary pre-conditions for combination with PL. Combined with $more_\mu$ and the interpretation of the *than*-clause (i.e., the number of occasions of Bill being available), the result is a property of pluralities of events E, each atom of which is temporally constituted by a state of being available.

(31)



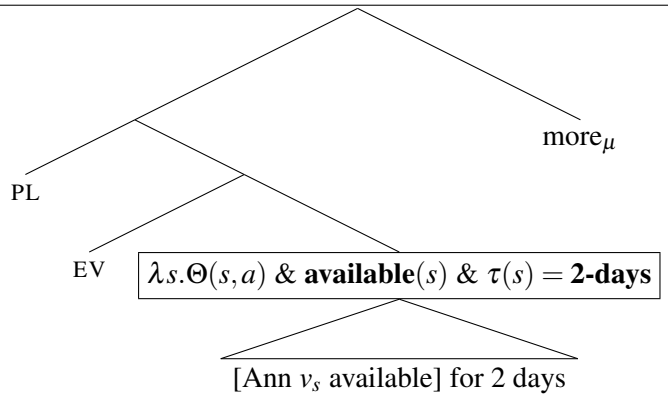
When the *for*-phrase appears between the adjective and *more*, I posit that its syntactic position is lower than that of the comparative complex. Abbreviating the thematic relation 'holder' with Θ, the target sentence has the interpretation in (32). It has the value TRUE iff there is a plurality of events, each of which is temporally constituted by an availableness state holding for 2 days, and whose number is greater than δ (i.e., the number of such events of Bill being available).

(32) $[\![\text{Ann was [available for two days] more than Bill was.}]\!]^A =$
$\exists E[\forall e \in E[\exists s[e \rhd_\tau s \;\&\; \Theta(s,a) \;\&\; \textbf{available}(s) \;\&\; \tau(s) = \textbf{2-days}]] \;\&\; A(\mu)(E) \succ \delta]$

14 Combining the subject higher than EV would lead to Ann bearing a thematic relation to an event, rather than to a state; standard practice has it that the kinds of thematic roles individuals play in states and events are different. There is no obvious indication that the thematic relation between *Ann* and *available* has changed since the 'low' comparatives.

Deriving (32), the *for*-phrase combines with the adjectival property of states, and is interpreted as relating the state to its runtime. Otherwise, the derivation proceeds in the same way as (31): the state property combines with EV, delivering a property of events, and then with PL.

(33) $\boxed{\lambda d.\lambda E.\forall e \in E[\exists s[e \rhd_\tau s \ \&\ \Theta(s,a) \ \&\ \textbf{available}(s) \ \&\ \tau(s) = \textbf{2-days}]] \ \&\ A(\mu)(E) \succ d}$

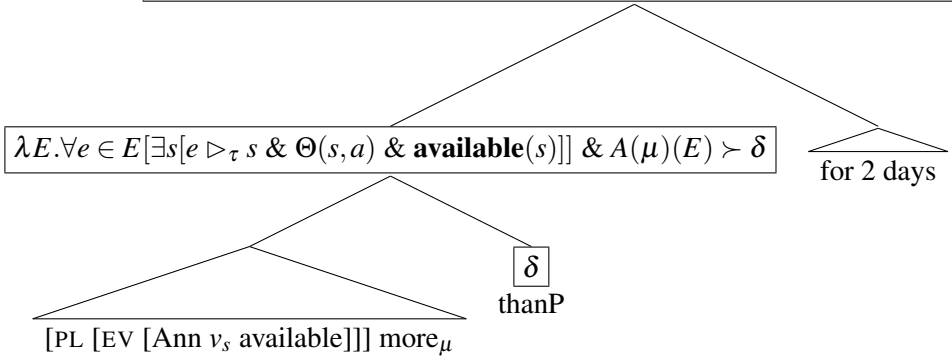


When the *for*-phrase appears outside the scope of the comparative, it has the interpretation in (34). This interpretation is true if there is a plurality of events occurring over two days, each atom of which is temporally constituted by an availableness state, and whose number is greater than δ (i.e., the number of such events for Bill).

(34) $[\![$Ann was [available more than Bill was] [for two days].$]\!]^A =$
$\exists E[\forall e \in E[\exists s[e \rhd_\tau s \ \&\ \Theta(s,a) \ \&\ \textbf{available}(s)]] \ \&\ A(\mu)(E) \succ \delta \ \&\ \tau(E) = \textbf{2-days}]$

The only difference here, compositionally, is that which seems evident on the surface: the *for*-phrase combines high, after the comparative complex, and applies to a plural property of events, (35). Now, instead of contributing the time of the states that constitute the atoms of such a plurality, it establishes the duration of the plurality itself.

(35) $\boxed{\lambda E.\forall e \in E[\exists s[e \rhd_\tau s \ \&\ \Theta(s,a) \ \&\ \textbf{available}(s)]] \ \&\ A(\mu)(E) \succ \delta \ \&\ \tau(E) = \textbf{2-days}}$



3.3 Supporting evidence for states

So far, I have presented data challenging traditional degree-theoretic approaches to the semantics of gradable adjectives that interprets them as measures of individuals. I leveraged two layers of eventualities—state and event—to account for those data. The picture would be cleaner if there were independent reasons to suppose that states were involved already at the lexical level with the adjective, and if there were other areas where it is useful to posit the possibility of an eventive layer on top. This section reviews some of the evidence on states.

Moltmann (2009), in her account that characterizes the relevant quantification in terms of abstract tropes rather than concrete states,[15] suggests that adjectives like *happy* must introduce something into the semantic derivation: that 'something that it is' is can be referred to in definite descriptions with deadjectival nouns, (36a), and anaphorically referred to with pronouns, (36b). (Notice that, while it might be theoretically possible to analyze (36a) as explicitly referring to a degree, *the degree of Ann's happiness lasted awhile* sounds atrocious.)

(36) a. **The happiness** Ann felt with herself was deserved.
b. Luckily, **it** lasted awhile.

This 'something that it is' is likely a state, and not something abstract like a fact, in light of the pattern in (37) (Higginbotham 2000). Indeed, Higginbotham (2000) points out that definites with language that explicitly refers to states seem semantically equivalent to sentences without such reference; e.g., (38). He also points out that the sentences with the deadjectival nominal forms mutually entail their correspondents with the bare adjective form, (39).

(37) a. The state of Mary's happiness lasted awhile.
b. ? The fact of Mary's happiness lasted awhile.

(38) (The state of) Ann's happiness was threatened.

(39) *Ann was happy for 10 years* is true iff *Ann's happiness lasted 10 years* is.

Furthermore, an argument like one given by Landman (2000) for state arguments with phrases like *in love with* can be reproduced with adjectives like *happy* (Wellwood 2015). Landman cites a case where the positive predication is asserted to hold of an entity, as well as the fact that the positive predication holds, and a downstream pronoun can pick up reference to the initial positive predication to the exclusion of the fact, (40). A variant on Wellwood's (2015) example is given in (41).

15 This is a distinction I will unfortunately not have anything insightful to say about.

(40) Oedipus was in love with Jocasta. Though the fact that he was in love with her was a burden on his conscience, he had to admit that it felt good.
(intended: ⟦it⟧ = *being in love with Jocasta*)

(41) Ann was (very) happy that Bill failed. Though the fact that she was happy that he failed made her feel bad, she had to admit that it felt good.
(intended: ⟦it⟧ = *being happy that Bill failed*) .

3.4 Supporting evidence for events

Introducing events allows for a straightforward extension of accounts of adverbial modifiers that quantify over events to adjectives like *happy*. States just don't have the right sort of properties to be semantically compatible with these modifiers.

Rothstein (1995) analyzes expressions like *every time* in verbal predications like (42a) this way: the adverbial introduces a matching relation between events of Bill calling and of Ann jumping. Wrapping states into events allows for a simple extension of this analysis to S(tage)-level gradable adjectives, (42b). These constructions require not merely that a certain state holds, but that it is the kind of state that can hold sometimes and not others—precisely what is implied by 'wrapping' states with events. This can help explain why I(individual)-level adjectives are uncomfortable here, (42c): the implication that there are in principle multiple such events conflicts with their lexical preference to express stable properties of individuals.[16]

(42) a. Every time Bill called, Ann jumped.

b. Every time Bill called, Ann was happy.

c. ? Every time Bill called, Ann was intelligent.

The requirement for multiple discrete events is incompatible with the notion of multiple discrete states. States are not discrete the way events are, and stative predicates are homogeneous in a way that eventive predicates like *jump* are not (see Rothstein 1999 for extensive discussion). What this amounts to is that if a state holds over a given interval of time, it holds at every moment of that interval; events, even if they occur over a given interval of time, needn't occur at every moment of that interval. This is easiest to show with nominalized forms. A discourse like (43a) can easily be both felicitous and true, but that in (43b) is odd.

(43) a. Ann's happiness lasted an hour; you couldn't identify a moment within that hour when she wasn't happy.

16 If the relevant events are once in a lifetime, maybe these constructions aren't so bad: imagine that Ann is reincarnated whenever she dies; then perhaps it can be both felicitous and true that *Every time Ann is born, she is intelligent (again)*.

b. ? Ann's jump lasted an hour; you couldn't identify a moment within that hour when she didn't jump.

An account like I have offered, in which states can be wrapped into events, could also be applied in other cases where adverbial modifiers appear to target events (see McNally 1993; Kratzer 1989). The character of the interpretation of a sentence like (44a) doesn't appear to differ all that much from the good examples in (42): (44a) says that for each event of Ann playing the piano, there is an event of her singing a song. The same analysis can be applied to (44b), and can be leveraged to explain why (44c) is odd.

(44) a. When Ann plays the piano, she sings a song.

b. When Ann plays the piano, she is happy.

c. ? When Ann plays the piano, she is intelligent.

Finally, Glasbey (1992) observes an interesting pattern of interpretation for the modifier *then* that suggests the same conclusion. She observes that, when a sentence with sentence-initial *then* occurs following an event description, it functions to update narrative time: (45a) is interpreted as a sequence of non-temporally overlapping events. This type of interpretation is possible for S-level adjectives like *happy*, (45b), too, but not for I-level adjectives like *intelligent*, (45c).

(45) a. Ann swam. Then Bill jumped.

b. Ann was happy. Then Bill liked her.

c. ? Ann was intelligent. Then Bill liked her.

4 Conclusion

I have considered different combinations of S-level adjectives, 'low' and 'high' attachments of *more*, and temporal *for*-phrases within and outside of the scope of the comparative. The 'low' comparatives have the type of interpretation usually considered in the semantics of gradable adjectives—the degree-like reading—whereas the 'high' comparatives have a type of interpretation more characteristic of verbal comparatives—comparing numbers of things. I captured this difference in terms of *what is quantified*: degrees of ADJ-ness are compared when states are measured, and numbers of occasions when events are measured.

The fact that sentences with *Ann is happy more than Bill* intuitively involve comparison of numbers of occasions, while sentences like *Ann is tall more than Bill* are odd, can be captured straightforwardly on the present account. The 'high' attachment comparative requires a plurality of (atomic) events, and here the atoms

of those pluralities are temporally constituted by some state. If temporal constitution implies that, in principle, the state holds sometimes but not others, the incompatibility with I-level adjectives makes sense: we can't coherently hear an adjective as expressing a long-lasting, stable property, as well as one that is transient. This idea thus dovetails with discussion by Nakanishi (2007) and Wellwood et al. (2012) that, cross-categorially, degree constructions involve non-singular predication.

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